Allegheny Ludlum
An Allegheny Technologies Company

MATERIAL SAFETY DATA SHEET

1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT(S): STEEL - A50, 301, 301L, 302, 302B, 304, 304H, 304L, 304LN, 304N, 305, 316, 316L, 316LN, 316TI, 317, 317L, 317LX, 317LXN, 317XN, 321, 321H, 347, 348, 370, 388 Ze-Cor™ , A610, A611, 850, 13-8 PH , 307

MSDS CATEGORY: I-B

MANUFACTURER:

ALLEGHENY LUDLUM
RIVER ROAD
BRACKENRIDGE, PA 15014

DESCRIPTION: Solid product, various forms and uses

EMERGENCY PHONE: 724-226-5555

INFO. PHONE: 724-226-6384 (M-F, 9 a.m.-4:30 p.m. EST)

CHEMTREC: 800-424-9300

DATE OF APPROVAL: 09-15-2002

2 - COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	PERCENTAGE BY WEIGHT	OSHA PEL	ACGIH TLV
Iron	7439-89-6	52 - 78	10 mg/m^3, Iron Oxide form, fume	5 mg/m^3, Iron Oxide form, dust and fume
Chromium	7440-47-3	12 - 24	1 mg/m^3, metal and insoluble salts 0.5 mg/m^3, Cr (III) compounds 0.1 mg/m^3, Cr (VI) compounds	0.5 mg/m^3, metal and Cr (III) compounds 0.05 mg/m^3, Cr (VI) water soluble compounds 0.01 mg/m^3, Cr (VI) water insoluble compounds
Nickel	7440-02-0	6.0 - 19	1 mg/m^3, metal and insoluble compounds	1.5 mg/m^3, metal 0.1 mg/m^3, soluble compounds 0.2 mg/m^3, insoluble compounds
Molybdenum	7439-98-7	0 - 5.0	5 mg/m^3, soluble Mo compounds (as Mo) 15 mg/m^3, insoluble Mo compounds, total dust (as Mo)	5 mg/m^3, soluble Mo compounds (as Mo) 10 mg/m^3, insoluble Mo compounds (as Mo)
Silicon	7440-21-3	0 - 6	15 mg/m^3, total dust 5 mg/m^3, respirable fraction	10 mg/m^3, total dust
Manganese	7439-96-5	0 - 2.0	5 mg/m^3 Ceiling, Mn compounds and Mn fume (as Mn)	0.2 mg/m^3, elemental and inorganic compounds (as Mn)
Tungsten	7440-33-7	0 - 1.8	15 mg/m^3, total dust (PNOR) 5 mg/m^3, respirable fraction (PNOR) (not regulated)	1 mg/m^3, 3 mg/m^3 STEL soluble W compounds (as W) 5 mg/m^3, 10 mg/m^3 STEL insoluble W compounds (as W)
Aluminum	7429-90-5	0 - 1.5	15 mg/m^3, metal, total dust (as Al) 5 mg/m^3, metal, respirable fraction (as Al)	10 mg/m^3, metal dust 5 mg/m^3, welding fume
Columbium	7440-03-1	0 - 1.0	15 mg/m^3, total dust (PNOR) 5 mg/m^3, respirable fraction (PNOR) (not regulated)	10 mg/m^3, total dust (PNOC) (not classified)
Titanium	7440-32-6	0 - 0.7	15 mg/m^3, Titanium Dioxide form, total dust	10 mg/m^3, Titanium Dioxide form, total dust
Copper	7440-50-8	0 - 0.75	0.1 mg/m^3, fume (as Cu) 1 mg/m^3, dust and mist (as Cu)	0.2 mg/m^3, fume (as Cu) 1 mg/m^3, dusts and mists (as Cu)

Cobalt	7440-48-4	0 - 1.0	0.1 mg/m^3, metal, dust, and fume (as Co)	0.02 mg/m^3, elemental and inorganic compounds (as Co)

NOTE: 1) All exposure limits are 8-hour TWAs unless otherwise specified. 2) As defined by OSHA, STEL (Short Term Exposure Limit) is an employee's fifteen-minute, time-weighted average exposure which must not be exceeded during a workday. 3) All commercial metals may contain small amounts of various elements in addition to those specified. These small quantities (less than 0.1%), frequently referred to as "trace" or "residual" elements, generally originate in the raw material used. These elements may include, but are not limited to the following: Sulfur, Phosphorous, Nitrogen, Aluminum, Arsenic, Boron, Cadmium, Calcium, Lead, Tin, Titanium, Vanadium, and Zirconium. Abbreviations and acronyms are defined in Section 16.

3 - HAZARDS IDENTIFICATION

GENERAL HAZARD STATEMENT: Solid metallic products distributed by Allegheny Ludlum are generally classified as "articles" and do not constitute a hazardous material in solid form under the terms of the OSHA Hazard Communication Standard. Any articles manufactured from these solid products would be generally classified as non-hazardous. However, some metallic elements contained in these products have been determined to be toxic and are subject to regulatory controls. These elements can be emitted as airborne contaminants under certain processing conditions such as burning, melting, cutting, sawing, brazing, grinding, milling, machining.

Certain materials and equipment utilized in processing of steel products (cutting/machining fluids, coatings, processing lubricants, cleaning/pickling chemicals, welding fluxes, torch and plasma cutting systems) may constitute a health hazard and should be treated accordingly.

EMERGENCY OVERVIEW: Odorless solid product in various forms, silver-gray color. This formed solid metal product poses little or no immediate health or fire hazards. Product may be coated - refer to appropriate coating MSDS for physical and health hazards. When product is subjected to welding, burning, melting, sawing, brazing, grinding, or other similar processes, potentially hazardous airborne particulate and fumes may be generated. These operations should be performed in well-ventilated areas, and if appropriate, respiratory protection and other PPE should be utilized.

PRIMARY ROUTE OF ENTRY: Inhalation of dust or fume during welding, burning, melting, cutting, brazing, grinding, machining and other operations.

NOTE: The composition of fumes from welding are dependent not only on the metal being welded, but also on the welding process and electrodes used. A full health hazard assessment should be performed by a competent health and safety professional for all welding and other operations performed on this product.

Acute Effects of Overexposure:

INHALATION:
- Exposures to high concentrations of metallic fumes or dusts may result in irritation of the respiratory tract and/or sensitization of the lungs and other mucous membranes.
- Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever" (symptoms shown below under *SIGNS AND SYMPTOMS OF OVEREXPOSURE*).

EYE:
- Exposure to high concentrations of fumes or dusts may cause irritation and/or sensitization.

SKIN:
- Exposure to dust may cause irritation or sensitization, possibly leading to dermatitis.

INGESTION:
- Ingestion of harmful amounts of product as distributed is unlikely due to its solid, insoluble form. Ingestion of dust may cause nausea and/or vomiting. Serious effects may occur if large amounts of dust are swallowed.

Chronic Effects of Overexposure:

EXCESSIVE AND REPEATED EXPOSURES TO FUME OR DUST GENERATED DURING PROCESSING MAY CAUSE:
- Allergic sensitization - dermatitis and asthma
- Lung inflammation and damage - pneumonitis, pneumonia, bronchitis, siderosis (benign lung disease caused by inhaling iron particles), diffuse pulmonary fibrosis

- Nasal perforation and nasal cavity damage
- Eye inflammation
- Central nervous system damage, possibly permanent
- Kidney damage
- Liver damage
- Gout - inflammation of the joints (associated with some metals)

CARCINOGENICITY:

- The carcinogenicity of this solid product as a whole has not been tested.
- Individual components and some compounds of these elemental metals may have been associated with carcinogenicity by NTP and IARC.
- No component greater than 0.1% by weight within this solid product is regulated by OSHA within 29 CFR 1910 Subpart Z as a carcinogen.

SYNERGISTIC MATERIALS: Inhalation of high concentrations of Iron Oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

SIGNS AND SYMPTOMS OF OVEREXPOSURE:

- Redness, swelling, itching, and/or irritation of skin and eyes
- Respiratory difficulties - coughing, wheezing, shortness of breath, dyspnea, decreased pulmonary function
- Metal fume fever - symptoms consist of chills and fever (very similar and easily confused with flu symptoms), a metallic taste in the mouth, dryness and irritation of the throat. The symptoms occur a few hours after excessive exposures and usually last from 12 to 48 hours. Long term effects from metal fume fever have not been noted in the literature.
- Central nervous system effects may show languor, sleepiness, weakness, emotional disturbances, spastic gait, paralysis.
- Kidney damage may be seen as changes in urine output and appearance, lower back pain, and edema (swelling from fluid retention).
- Liver damage may be seen by loss of appetite, jaundice (yellowish skin color) and occasional pain in the upper abdomen on the left side.
- Anorexia and Weight loss

NOTE: For specific toxicological and other chronic effects information concerning the components of this solid steel product, *refer to SECTION 11.0, TOXICOLOGICAL INFORMATION.*

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: For airborne fume and dust, preexisting diseases of the lungs, skin, eyes, and other mucous membranes. Inhalation of high concentrations of Iron Oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

4 - FIRST AID MEASURES

INHALATION: If overexposure occurs, immediately remove victim from the adverse environment to fresh air and seek medical attention. If breathing has stopped, certified individuals should perform CPR. Keep affected person warm and at rest.

EYE: Immediately flush with large amounts of running water for several minutes. Seek prompt medical attention.

SKIN: If dust gets on skin, wash contaminated area with soap and water. Remove and wash contaminated clothing. If a persistent rash or irritation occurs, seek medical attention.

INGESTION: Get medical attention immediately.

5 - FIRE FIGHTING MEASURES

FLASH POINT (Method Used): N/A
AUTOIGNITION TEMPERATURE: N/A
FLAMMABILITY CLASSIFICATION: N/A

FLAMMABLE LIMITS: N/A
GENERAL FIRE HAZARD: None for solid formed product

EXTINGUISHING METHOD: For solid formed product, as appropriate for surrounding fire. A fire involving finely divided particles should be treated as a Class D combustible metal fire. Fire should be extinguished by a properly trained and experienced firefighter. Proper care should be taken in applying extinguishing agent and in allowing to burn itself out.

FIRE FIGHTING EQUIPMENT: For solid formed product, as appropriate for surrounding fire. Positive pressure SCBA and structural firefighter's protective clothing should be used at a minimum for surrounding fire.

UNUSUAL FIRE OR EXPLOSION HAZARDS: This solid formed product does not constitute a fire or explosion hazard. Finely divided, suspended particulates may present a fire and explosion hazard in the presence of an ignition source. In addition, applied coatings may be combustible. For fires involving coated product, consult the appropriate coating MSDS.

Finely divided product (e.g. dust, shavings, etc.) may be combustible. May be ignited by heat, sparks, or flames. May burn rapidly with flare-burning effect. Fire may produce irritating or poisonous gases. High concentrations of airborne dust in an enclosed area can explode or burn if exposed to a source of ignition. Care should be taken to avoid the generation of airborne dust. Use of water on finely divided product may cause explosive hydrogen gas and heat to be evolved.

EXPLOSION DATA: *Sensitivity/Mechanical Impact*: N/A for solid product *Sensitivity/Static Discharge*: N/A for solid product

HAZARDOUS COMBUSTION PRODUCTS: N/A for solid formed product. Toxic metal and metallic oxide fumes may be evolved from fires involving finely divided particles and during torch-cutting operations.

6 - ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED: Minimal problems with spills of this product would occur because of its solid form. The following precautions apply to spills involving finely divided particles:

- Shut off ignition sources; no flares, smoking or flames should be in or near hazard area.
- Do not touch or walk through spilled material. Clean up using methods which avoid dust generation.
- Compressed air should not be used to clean up spills.
- During cleanup, skin and eye contact and inhalation of dust should be avoided as much as possible.
- Provide local exhaust or dilution ventilation as required.
- Appropriate PPE should be worn during cleanup if exposure limits are exceeded (*see SECTION 8, EXPOSURE CONTROLS/PERSONAL PROTECTION*).
- Collect material in compatible and appropriately labeled containers.
- For small dry spills, place material into clean dry container with a clean shovel, and cover loosely; move container from spill area.
- Comply with federal, state, and local regulations regarding reporting of spills and waste disposal.

7 - HANDLING AND STORAGE

HANDLING: Avoid breathing of and contact with fumes and dusts during processing. No specific requirements for solid formed steel product.

STORAGE: Keep away from incompatible materials (*see SECTION 10, STABILITY AND REACTIVITY*). No other specific storage procedures are required for solid formed steel product.

8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Local and/or general exhaust ventilation should be used to keep worker exposure below applicable exposure limits (*see SECTION 2, COMPOSITION/INFORMATION ON INGREDIENTS, for PELs and TLVs*) during welding, brazing, grinding, machining, and other processes which may generate airborne contaminants.

RESPIRATORY: When engineering or administrative controls cannot maintain exposures below permissible limits during welding, brazing, machining, and other processes which may generate airborne contaminants or while being instituted, use an appropriate NIOSH/MSHA approved respirator. If respiratory protection is required, all appropriate requirements as set forth in 29 CFR 1910.134 must be met. A competent health and safety professional should be consulted for respirator selection, fit testing, and training. Use a

NIOSH-approved positive-pressure, air-supplied respirator if exposure levels are unknown, or any other circumstance where an air-purifying respirator would not be adequate.
GLOVES: Suitable for protection against physical injury and skin contact during handling and processing.

EYE: Safety glasses or goggles when there is a reasonable probability of flying particles or high levels of airborne dust or fume.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Adequate footwear (safety shoes if necessary) and clothing that protects skin from prolonged or repeated contact. Change clothing if there is a reasonable probability of contamination.

9 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: NIF for steel product(Fe-5432/Cr-3992/Ni-5252 °F)
Vapor Pressure (mm Hg, @ 68 °F): Negligible
Vapor Density (AIR = 1): N/A
Melting Point: NIF for steel product(Fe-2797/Cr-3452/Ni-2651 °F)
Appearance and Odor: Silver-gray metallic solid form, odorless

Specific Gravity (H_2O = 1): 7 –
Evaporation Rate: N/A
Solubility in water: Insoluble
pH: N/A

10 - STABILITY AND REACTIVITY

STABILITY: Stable under normal conditions of use, storage and transport for solid formed product.

CONDITIONS TO AVOID: Contact with incompatible materials. Avoid creating finely divided, concentrated airborne particulates in the presence of ignition sources.

INCOMPATIBLE MATERIALS: Oxidizers. Reacts with strong acids to form explosive hydrogen gas and heat.

HAZARDOUS DECOMPOSITION PRODUCTS: Extreme heat from fire or processing (e.g. welding, brazing, machining, etc.) may produce toxic or irritating airborne particulate, including metal and metallic oxide fumes. Reaction of some metals with water, steam, acids, etc. can evolve hydrogen, which is a highly dangerous fire and explosion hazard.

HAZARDOUS POLYMERIZATION: Will not occur

11 - TOXICOLOGICAL INFORMATION

Iron: Excessive exposure of eyes to airborne iron dust can cause conjunctivitis, choroiditis, and retinitis. Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in development of a benign pneumoconiosis, called siderosis, which is observable via x-ray. No physical impairment of lung function has been associated with siderosis. Inhalation of excessive concentrations of iron oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. LD50 (oral, rat) - 30 gm/kg; LC50 - NIF.

Chromium: The health hazards associated with exposure to chromium are dependent on its oxidation state. The metal form (chromium as it exists in this product) is of low toxicity. The hexavalent form and some trivalent forms are toxic. Adverse effects of the hexavalent form on the skin may include ulcerations, dermatitis, and allergic skin reactions. Inhalation of hexavalent chromium compounds can result in ulceration and perforation of the mucous membranes of the nasal septum, irritation of the pharynx and larynx, asthmatic bronchitis, bronchospasms and edema. Respiratory symptoms may include coughing and wheezing, shortness of breath, and nasal itch. LD50 (oral) - NIF; LC50 - NIF.

Carcinogenicity - Chromium and most trivalent chromium compounds have been listed by NTP as having inadequate evidence for carcinogenicity in experimental animals. According to NTP, there is sufficient evidence for carcinogenicity in experimental animals for the following hexavalent chromium compounds: calcium chromate, chromium trioxide, lead chromate, strontium chromate, and zinc chromate. IARC has listed chromium metal and its trivalent compounds within Group 3 (The agent is not classifiable as to its carcinogenicity to humans). Chromium is not regulated as a carcinogen by OSHA (29 CFR 1910 Subpart Z). ACGIH has classified chromium metal and trivalent chromium compounds as A4, not classifiable as a human carcinogen. Water soluble hexavalent chromium compounds have been classified by ACGIH as A1, confirmed human carcinogen.

Nickel: Nickel fumes are respiratory irritants and may cause pneumonitis. Exposure to nickel and its compounds may result in the development of a dermatitis known as "nickel itch" in sensitized individuals. The first symptom is usually itching, which occurs up to 7 days before skin eruption occurs. The primary skin eruption is erythematous, or follicular, which may be followed by skin ulceration. Nickel sensitivity, once acquired, appears to persist indefinitely. LC50 - NIF; LD50 (oral) - NIF.

Carcinogenicity - Nickel and certain nickel compounds have been listed by NTP as being reasonably anticipated to be carcinogens. IARC has listed nickel compounds within group 1 (there is sufficient evidence for carcinogenicity in humans) and nickel within group 2B (agents which are possibly carcinogenic to humans). Nickel is not regulated as a carcinogen by OSHA (29 CFR 1910 Subpart Z). Based upon epidemiological data, ACGIH (1998) has designated elemental nickel as category A5, not a suspected human carcinogen.

Molybdenum: Based on animal experiments, molybdenum and its compounds are highly toxic. Some evidence of liver dysfunction with hyperbilirubinemia have been reported in workmen chronically exposed in a Soviet Mo-Cu plant. In addition signs of gout have been found in factory workers and among inhabitants of Mo-rich areas of Armenia. The main features were joint pains in the knees, hands, feet, articular deformities, erythema, and edema of the joint areas. LD50 (oral) - NIF; LC50 - NIF.

Silicon: Elemental silicon is an inert material which appears to lack the property of causing fibrosis in lung tissue. However, slight pulmonary lesions have been reported in laboratory animals from intratracheal injections of silicon dust. Silicon dust has little adverse affect on lungs and does not appear to produce significant organic disease or toxic effects when exposures are below permissible limits. Silicon may cause chronic respiratory effects. Crystalline silica (silicon dioxide) is a potent respiratory hazard. However, the likelihood of crystalline silica generation during normal processing is very remote. LD50 (oral) - 3160 mg/kg rat; LC50 - NIF.

Manganese: Chronic manganese poisoning may result from prolonged inhalation of manganese dust and fumes. The central nervous system is the chief site of damage from the disease, which may result in permanent disability. Symptoms include languor, sleepiness, weakness, emotional disturbances, spastic gait, recurring leg cramps, and paralysis. A high incidence of pneumonia and other upper respiratory infections has been found in workers exposed to dust or fume of manganese compounds. Manganese compounds are experimental equivocal tumorigenic agents. LD50 (oral, rat) - 30 gm/kg; LC50 - NIF; TCLo - 2300 $\mu g/m^3$ (man).

Tungsten: Tungsten has been shown to act by antagonizing the action of the essential trace element, Molybdenum. Tungsten metal powder administered to animals has been shown in several studies as not totally inert. One study found that guinea pigs treated orally or intravenously with tungsten suffered from anorexia, colic, incoordination of movement, trembling, dyspnea and weight loss. Long industrial experience has indicated no pneumoconiosis to develop among workers exposed solely to tungsten or its insoluble compounds (at air concentrations of the order of 5 mg/m^3). In NIOSH's criteria document, two Russian studies were cited which indicated and incidence of 9-11% pulmonary fibrosis among employees exposed to tungsten without cobalt co-exposure. LD50 (intraperitoneal) - 5 g/kg rat; LC50 - NIF.

Aluminum: Inhalation of finely divided aluminum and aluminum oxide powder has been reported as a cause of pulmonary fibrosis and lung damage. This effect, known as Shaver's Disease, is complicated by the presence in the inhaled air of silica and oxides of iron. May also be implicated in Alzheimer's disease. LD50 (oral) - NIF; LC50 - NIF.

Columbium: Interferes with calcium as an activator of enzyme systems. LD50 (oral) - NIF; LC50 - NIF.

Titanium: Elemental titanium and titanium dioxide is of a low order of toxicity. Laboratory animals (rats) exposed to titanium dioxide via inhalation have developed small localized areas of dark-colored dust deposits in the lungs. Excessive exposure in humans may result in slight changes in the lungs. LD50 (oral) - NIF; LC50 - NIF.

Copper: Industrial exposure to copper fumes, dusts, or mists may result in metal fume fever with atrophic changes in nasal mucous membranes. Chronic copper poisoning results in Wilson's Disease, characterized by a hepatic cirrhosis, brain damage, demyelination, renal disease, and copper deposition in the cornea. Copper fume (respirable) has appeared on the ACGIH Notice of Intended Changes (1996 & 1997). The intended ACGIH TLV for respirable copper fume is 0.05 mg/m^3. LD50 (oral) - NIF; LC50 - NIF.

Cobalt: Cobalt dust may cause an asthma-like disease with symptoms ranging from cough, shortness of breath and dyspnea to decreased pulmonary function, nodular fibrosis, permanent disability, and death. Exposure to cobalt may cause weight loss, dermatitis, and respiratory hypersensitivity. LD50 (oral, rat) - 6171 mg/kg; LC50 - NIF.

Carcinogenicity - IARC has listed cobalt and cobalt compounds within group 2B (agents which are possibly carcinogenic to humans). ACGIH has placed cobalt and inorganic compounds in category A3 (Experimental animal carcinogen - the agent is carcinogenic in experimental animals at a relatively high dose, by route(s), histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure. Cobalt has been classified by the Federal Republic of Germany to be carcinogenic to experimental animals.

12 - ECOLOGICAL INFORMATION

N/A for solid steel product in its as shipped form. Articles produced from solid product are not an ecological hazard. NIF on specific product to establish its effect if released into the environment in finely divided form. It is believed that finely divided product, based on its components, will be hazardous to fish, animals, plants and the environment if released, the degree of which would depend on the particle size and quantity released. In addition, if particles are small enough, material may be ingested by wildlife, with possible toxic effects. The solid product is not expected to migrate easily into soil or groundwater based upon its insoluble form, however, finely divided material can become mobile in water and contaminate soil and groundwater. This material may persist in the environment for long periods, based upon its corrosion resistant, insoluble, and non-biodegradable properties. In addition, heavy metals may contaminate the food chain and ultimately be consumed by humans. Some components will react with oxygen to form metallic oxides; the rate of oxidation depends upon prevailing conditions. Iron oxidizes most rapidly in moist air. Metallic particulate discharged to a POTW may pass-through or contaminate sewage sludge, may interfere with the treatment system process, and may be non-compliant with a POTW permit or other regulations.

13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: If product as shipped becomes a solid waste, it would not be classified as a hazardous waste, and should be recycled. Product dusts from processing may be classified as a hazardous waste, depending on various properties of the dust (e.g. toxicity, solubility, flammability), which are defined further within 40 CFR 261 and possibly more restricting state and/or local regulations. Solid waste generated from product processing should be classified by a competent environmental professional and disposed, processed, or recycled in accordance with federal, state and local regulations.

14 - TRANSPORT INFORMATION

HAZARDOUS MATERIALS DESCRIPTION/PROPER SHIPPING NAME: N/A for solid formed product.
HAZARD CLASS: N/A for solid formed product.
IDENTIFICATION NO.: N/A for solid formed product.

15 - REGULATORY INFORMATION

SARA TITLE III HAZARD CATEGORIZATION: Product (dust and fume) is categorized as an immediate (acute) health hazard and a delayed (chronic) health hazard as defined by 40 CFR 370.
SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (EHSs): No components are listed as extremely hazardous substances.
SARA TITLE III SECTION 313 REPORTABLE SUBSTANCES: Nickel, Chromium, Cobalt, Aluminum (fume or dust), and Manganese are subject to reporting requirements (Copper is less than the 1% de minimis level).
CERCLA HAZARDOUS SUBSTANCES: Nickel* (threshold 100 lbs.), Chromium* (threshold 5000 lbs.), and Copper* (threshold 5000 lbs.). *Note: CERCLA reporting only if diameter of particles released is less than 100 micrometers.
PENNSYLVANIA R-T-K LIST: Listed components (greater than 0.1 % by weight) - Aluminum (E), Manganese (E), Molybdenum, Nickel (E,S), Silicon, Chromium (E,S), Cobalt (E), Copper (E), and Tungsten. E - environmental hazard, S - special hazardous substance.
NEW JERSEY R-T-K ENVIRONMENTAL HAZARDOUS SUBSTANCE LIST: Listed components - Aluminum (as dust and fume), Chromium, Cobalt, Copper, Manganese, and Nickel.
CALIFORNIA PROPOSITION 65: Listed possible trace (much less than 0.1% by weight) elements known by the state to cause cancer - Arsenic (inorganic), Cadmium, Lead; Listed possible trace elements known by the state to cause reproductive toxicity - Lead; Listed components known by the state to cause cancer - Nickel, Cobalt (metal powder); Listed components known by the state to cause reproductive effects - None.

16 - OTHER INFORMATION

NFPA RATING (for solid formed product): Health: 1 Flammability: 0 Reactivity: 0

HMIS RATING (for solid formed product): Health: 1 Flammability: 0 Reactivity: 0 PPE: B

ABBREVIATIONS/ACRONYMS:

ACGIH	- American Conference of Governmental Industrial Hygienists
CAS	- Chemical Abstracts Service
CFR	- Code of Federal Regulations
CPR	- Cardiopulmonary Resuscitation
EST	- Eastern Standard Time
HMIS	- Hazardous Materials Identification System
IARC	- International Agency for Research on Cancer
mg/m3	- milligram per cubic meter of air
mppcf	- million particles per cubic foot
MSDS	- Material Safety Data Sheet
MSHA	- Mine Safety and Health Administration
N/A	- Not Applicable
NFPA	- National Fire Protection Association
NIF	- No Information Found
NIOSH	- National Institute for Occupational Safety and Health
NTP	- National Toxicology Program
OSHA	- Occupational Safety and Health Administration
PEL	- Permissible Exposure Limit
PNOR	- Particulate Not Otherwise Regulated
PNOC	- Particulate Not Otherwise Classified
POTW	- Publicly Owned Treatment Works
PPE	- Personal Protective Equipment
ppm	- parts per million
SCBA	- Self-contained Breathing Apparatus
STEL	- Short-term Exposure Limit
TLV	- Threshold Limit Value

NIA - No Information Available TWA- Time-weighted Average

NOTE: The percent composition in Section 2 reflects the range that is possible within this GROUP of products. These are not the technical specifications for a particular product. Also, specific grades may not include all of the hazardous ingredients in Section 2.

DISCLAIMER: All information, recommendations, and suggestions appearing herein concerning the product are based upon data believed to be reliable. It is the user's responsibility to determine the safety, toxicity, and suitability for their own use of the product described herein. Since the actual use by others is beyond our control, no guarantee, expressed or implied is made by AM Health and Safety, Inc. (AMH&S-acting consultant) and Allegheny Ludlum as to the effects of such use, the results to be obtained, or the safety and toxicity of the product, nor does AMH&S or Allegheny Ludlum assume any liability arising out of use by others of the product referred to herein. AMH&S and Allegheny Ludlum shall not in any event be liable for special, incidental or consequential damages in connection with this MSDS. This MSDS is not intended as a license to operate under, or recommendation to infringe on, any patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

This information is not intended to serve as a complete regulatory compliance document. This information is offered as a guide to the MSDS user. No guarantees can be made whether the user will be in complete or correct compliance with all applicable regulations when this MSDS is used. It is the user's responsibility to comply with all federal, state, and local regulations.

PREPARED BYAM Health and Safety, Inc. (acting consultant)	**REVISION NO.**: 10	**APPROVAL DATE**: September 15, 2002
MFR. CONTACT: J.R. Dierdorf (724-226-6384)	**SUPERSEDES MSDS DATED**: December 2, 1999	

Allegheny Ludlum
An Allegheny Technologies Company

MATERIAL SAFETY DATA SHEET

1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT(S): STEEL – 50, 62, 64, 67, 201, 201L, 201LN, 216, 219, 303, 307
MSDS CATEGORY: I-A
MANUFACTURER:
ALLEGHENY LUDLUM
RIVER ROAD
BRACKENRIDGE, PA 15014

DESCRIPTION: Silver-gray solid steel product, various forms and uses
EMERGENCY PHONE: 724-226-5555
INFO. PHONE: 724-226-6384 (M-F, 9 a.m.-4:30 p.m. EST)
CHEMTREC: 800-424-9300
DATE OF APPROVAL: 9-15-02

2 - COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	PERCENTAGE BY WEIGHT	OSHA PEL	ACGIH TLV
Iron	7439-89-6	55 - 75	10 mg/m^3, Iron Oxide form, fume	5 mg/m^3, Iron Oxide form, dust and fume
Chromium	7440-47-3	16 - 22	1 mg/m^3, metal and insoluble salts 0.5 mg/m^3, Cr (III) compounds 0.1 mg/m^3, Cr (VI) compounds	0.5 mg/m^3, metal and Cr (III) compounds 0.05 mg/m^3, Cr (VI) water soluble compounds 0.01 mg/m^3, Cr (VI) water insoluble compounds
Manganese	7439-96-5	0 - 16	5 mg/m^3 Ceiling, Mn compounds and Mn fume (as Mn)	0.2 mg/m^3, elemental and inorganic compounds (as Mn)
Nickel	7440-02-0	3.0 - 12	1 mg/m^3, metal and insoluble compounds	1.5 mg/m^3, metal 0.1 mg/m^3, soluble compounds 0.2 mg/m^3, insoluble compounds
Silicon	7440-21-3	0 - 4.5	15 mg/m^3, total dust 5 mg/m^3, respirable fraction	10 mg/m^3, total dust
Molybdenum	7439-98-7	0 - 2.7	5 mg/m^3, soluble Mo compounds (as Mo) 15 mg/m^3, insoluble Mo compounds, total dust (as Mo)	5 mg/m^3, soluble Mo compounds (as Mo) 10 mg/m^3, insoluble Mo compounds (as Mo)
Copper	7440-50-8	0 - 1.0	0.1 mg/m^3, fume (as Cu) 1 mg/m^3, dust and mist (as Cu)	0.2 mg/m^3, fume (as Cu) 1 mg/m^3, dusts and mists (as Cu)

NOTE: 1) All exposure limits are 8-hour TWAs unless otherwise specified. 2) As defined by OSHA, STEL (Short Term Exposure Limit) is an employee's fifteen-minute, time-weighted average exposure which must not be exceeded during a workday. 3) All commercial metals may contain small amounts of various elements in addition to those specified. These small quantities (less than 0.1%), frequently referred to as "trace" or "residual" elements, generally originate in the raw material used. These elements may include, but are not limited to the following: Aluminum, Sulfur, Phosphorous, Nitrogen, Arsenic, Boron, Cadmium, Calcium, Cobalt, Lead, Tin, Titanium, Vanadium, and Zirconium. Abbreviations and acronyms are defined in Section 16.

3 - HAZARDS IDENTIFICATION

GENERAL HAZARD STATEMENT: Solid metallic products distributed by Allegheny Ludlum are generally classified as "articles" and do not constitute a hazardous material in solid form under the terms of the OSHA Hazard Communication Standard. Any articles manufactured from these solid products would be generally classified as non-hazardous. However, some metallic elements contained in these products have been determined to be toxic and are subject to regulatory controls. These elements can be emitted as airborne contaminants under certain processing conditions such as burning, melting, cutting, sawing, brazing, grinding, milling, machining.

Certain materials and equipment utilized in processing of steel products (cutting/machining fluids, coatings, processing lubricants, cleaning/pickling chemicals, welding fluxes, torch and plasma cutting systems) may constitute a health hazard and should be treated accordingly.

EMERGENCY OVERVIEW: Odorless solid product in various forms, silver-gray color. This bulk solid alloy product poses little or no immediate health or fire hazards. Product may be coated - refer to appropriate coating MSDS for physical and health hazards. When product is subjected to welding, burning, melting, sawing, brazing, grinding, or other similar processes, potentially hazardous airborne particulate and fumes may be generated. These operations should be performed in well-ventilated areas, and if appropriate, respiratory protection and other PPE should be utilized.

PRIMARY ROUTE OF ENTRY: Inhalation of dust or fume during welding, burning, melting, cutting, brazing, grinding, machining and other operations.

NOTE: The composition of fumes from welding are dependent not only on the metal being welded, but also on the welding process and electrodes used. A full health hazard assessment should be performed by a competent health and safety professional for all welding and other operations performed on this product.

Acute Effects of Overexposure:

INHALATION:
- Exposures to high concentrations of metallic fumes or dusts may result in irritation of the respiratory tract and/or sensitization of the lungs and other mucous membranes.
- Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever" (symptoms shown below under *SIGNS AND SYMPTOMS OF OVEREXPOSURE*).

EYE:
- Exposure to high concentrations of fumes or dusts may cause irritation and/or sensitization.

SKIN:Exposure to dust may cause irritation or sensitization, possibly leading to dermatitis.

INGESTION:
- Ingestion of harmful amounts of product as distributed is unlikely due to its solid, insoluble form. Ingestion of dust may cause nausea and/or vomiting. Other serious effects may occur if large amounts of dust are swallowed.

Chronic Effects of Overexposure:

EXCESSIVE AND REPEATED EXPOSURES TO FUME OR DUST GENERATED DURING PROCESSING MAY CAUSE:
- Allergic sensitization - dermatitis and asthma
- Lung inflammation and damage - pneumonitis, pneumonia, bronchitis, siderosis (benign lung disease caused by inhaling iron particles)
- Nasal perforation and nasal cavity damage
- Eye inflammation
- Central nervous system damage, possibly permanent
- Kidney damage
- Liver damage
- Gout - inflammation of the joints (associated with some metals)

CARCINOGENICITY:
- The carcinogenicity of this solid product as a whole has not been tested.

- Individual components and some compounds of these elemental metals may have been associated with carcinogenicity by NTP and IARC.
- No component greater than 0.1% by weight within this solid product is regulated by OSHA within 29 CFR 1910 Subpart Z as a carcinogen.

SYNERGISTIC MATERIALS: Inhalation of high concentrations of Iron Oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

SIGNS AND SYMPTOMS OF OVEREXPOSURE:

- Redness, swelling, itching, and/or irritation of skin and eyes
- Respiratory difficulties - coughing, wheezing, shortness of breath, dyspnea, decreased pulmonary function
- Metal fume fever - symptoms consist of chills and fever (very similar and easily confused with flu symptoms), a metallic taste in the mouth, dryness and irritation of the throat. The symptoms occur a few hours after excessive exposures and usually last from 12 to 48 hours. Long term effects from metal fume fever have not been noted in the literature.
- Central nervous system effects may show languor, sleepiness, weakness, emotional disturbances, spastic gait, paralysis. Kidney damage may be seen as changes in urine output and appearance, lower back pain, and edema (swelling from fluid retention). Liver damage may be seen by loss of appetite, jaundice (yellowish skin color) and occasional pain in the upper abdomen on the left side.
- Anorexia and weight loss

NOTE: For specific toxicological and other chronic effects information concerning the components of this solid steel product, *refer to SECTION 11.0, TOXICOLOGICAL INFORMATION.*

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: For airborne fume and dust, preexisting diseases of the lungs, skin, eyes, and other mucous membranes. Inhalation of high concentrations of Iron Oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

4 - FIRST AID MEASURES

INHALATION: If overexposure occurs, immediately remove victim from the adverse environment to fresh air and seek medical attention. If breathing has stopped, certified individuals should perform CPR. Keep affected person warm and at rest.

EYE: Immediately flush with large amounts of running water for several minutes. Seek prompt medical attention.

SKIN: If dust gets on skin, wash contaminated area with soap and water. Remove and wash contaminated clothing. If a persistent rash or irritation occurs, seek medical attention.

INGESTION: Get medical attention immediately.

5 - FIRE FIGHTING MEASURES

FLASH POINT (Method Used): N/A
AUTOIGNITION TEMPERATURE: N/A
FLAMMABILITY CLASSIFICATION: N/A

FLAMMABLE LIMITS: N/A
GENERAL FIRE HAZARD: None for solid formed product

EXTINGUISHING METHOD: For solid formed product, as appropriate for surrounding fire. A fire involving finely divided particles should be treated as a Class D combustible metal fire. Fire should be extinguished by a properly trained and experienced firefighter. Proper care should be taken in applying extinguishing agent and in allowing to burn itself out.

FIRE FIGHTING EQUIPMENT: For solid formed product, as appropriate for surrounding fire. Positive pressure SCBA and structural firefighter's protective clothing should be used at a minimum for surrounding fire.

UNUSUAL FIRE OR EXPLOSION HAZARDS: This solid formed product does not constitute a fire or explosion hazard. Finely divided, suspended particulates may present a fire and explosion hazard in the presence of an ignition source. In addition, applied coatings may be combustible. For fires involving coated product, consult the appropriate coating MSDS.

Finely divided product (e.g. dust, shavings, etc.) may be combustible. May be ignited by heat, sparks, or flames. May burn rapidly with flare-burning effect. Fire may produce irritating or poisonous gases. High concentrations of airborne dust in an enclosed area can explode or burn if exposed to a source of ignition. Care should be taken to avoid the generation of airborne dust. Use of water on finely divided product may cause explosive hydrogen gas and heat to be evolved.

EXPLOSION DATA: *Sensitivity/Mechanical Impact*: N/A for solid product *Sensitivity/Static Discharge*: N/A for solid product

HAZARDOUS COMBUSTION PRODUCTS: N/A for solid formed product. Toxic metal and metallic oxide fumes may be evolved from fires involving finely divided particles and during torch-cutting operations.

6 - ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED: Minimal problems with spills of this product would occur because of its solid form. The following precautions apply to spills involving finely divided particles:

- Shut off ignition sources; no flares, smoking or flames should be in or near hazard area.
- Do not touch or walk through spilled material. Clean up using methods which avoid dust generation.
- Compressed air should not be used to clean up spills.
- During cleanup, skin and eye contact and inhalation of dust should be avoided as much as possible.
- Provide local exhaust or dilution ventilation as required.
- Appropriate PPE should be worn during cleanup if exposure limits are exceeded (*see SECTION 8, EXPOSURE CONTROLS/PERSONAL PROTECTION*).
- Collect material in compatible and appropriately labeled containers.
- For small dry spills, place material into clean dry container with a clean shovel, and cover loosely; move container from spill area.
- Comply with federal, state, and local regulations regarding reporting of spills and waste disposal.

7 - HANDLING AND STORAGE

HANDLING: Avoid breathing of and contact with fumes and dusts during processing. No specific requirements for solid formed steel product.

STORAGE: Keep away from incompatible materials (*see SECTION 10, STABILITY AND REACTIVITY*). No other specific storage procedures are required for solid formed steel product.

8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Local and/or general exhaust ventilation should be used to keep worker exposure below applicable exposure limits (*see SECTION 2, COMPOSITION/INFORMATION ON INGREDIENTS, for PELs and TLVs*) during welding, brazing, grinding, machining, and other processes which may generate airborne contaminants.

RESPIRATORY: When engineering or administrative controls cannot maintain exposures below permissible limits during welding, brazing, machining, and other processes which may generate airborne contaminants or while being instituted, use an appropriate NIOSH/MSHA approved respirator. If respiratory protection is required, all appropriate requirements as set forth in 29 CFR 1910.134 must be met. A competent health and safety professional should be consulted for respirator selection, fit testing, and training. Use a NIOSH-approved positive-pressure, air-supplied respirator if exposure levels are unknown, or any other circumstance where an air-purifying respirator would not be adequate.
GLOVES: Suitable for protection against physical injury and skin contact during handling and processing.

EYE: Safety glasses or goggles when there is a reasonable probability of flying particles or high levels of airborne dust or fume.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Adequate footwear (safety shoes if necessary) and clothing that protects skin from prolonged or repeated contact. Change clothing if there is a reasonable probability of contamination.

9 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: NIF for steel product(Fe-5432/Cr-3992/Mn-2273/Ni-5252 °F)
Vapor Pressure (mm Hg, @ 68 °F): Negligible
Vapor Density (AIR = 1): N/A
Melting Point: NIF for steel product(Fe-2797/Cr-3452/Mn-3807/Ni-2651 °F)
Appearance and Odor: Silver-gray metallic solid form, odorless

Specific Gravity (H_2O = 1): 7 - 9
Evaporation Rate: N/A
Solubility in water: Insoluble
pH: N/A

10 - STABILITY AND REACTIVITY

STABILITY: Stable under normal conditions of use, storage and transport for solid formed product.

CONDITIONS TO AVOID: Contact with incompatible materials. Avoid creating finely divided, concentrated airborne particulates in the presence of ignition sources.

INCOMPATIBLE MATERIALS: Oxidizers. Reacts with strong acids to form explosive hydrogen gas and heat.

HAZARDOUS DECOMPOSITION PRODUCTS: Extreme heat from fire or processing (e.g. welding, brazing, machining, etc.) may produce toxic or irritating airborne particulate, including metal and metallic oxide fumes. Reaction of some metals with water, steam, acids, etc. can evolve hydrogen, which is a highly dangerous fire and explosion hazard.

HAZARDOUS POLYMERIZATION: Will not occur

11 - TOXICOLOGICAL INFORMATION

Iron: Excessive exposure of eyes to airborne iron dust can cause conjunctivitis, choroiditis, and retinitis. Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in development of a benign pneumoconiosis, called siderosis, which is observable via x-ray. No physical impairment of lung function has been associated with siderosis. Inhalation of excessive concentrations of iron oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. LD50 (oral, rat) - 30 gm/kg; LC50 - NIF.

Chromium: The health hazards associated with exposure to chromium are dependent on its oxidation state. The metal form (chromium as it exists in this product) is of low toxicity. The hexavalent form and some trivalent forms are toxic. Adverse effects of the hexavalent form on the skin may include ulcerations, dermatitis, and allergic skin reactions. Inhalation of hexavalent chromium compounds can result in ulceration and perforation of the mucous membranes of the nasal septum, irritation of the pharynx and larynx, asthmatic bronchitis, bronchospasms and edema. Respiratory symptoms may include coughing and wheezing, shortness of breath, and nasal itch. LD50 (oral) - NIF; LC50 - NIF.

Carcinogenicity - Chromium and most trivalent chromium compounds have been listed by NTP as having inadequate evidence for carcinogenicity in experimental animals. According to NTP, there is sufficient evidence for carcinogenicity in experimental animals for the following hexavalent chromium compounds: calcium chromate, chromium trioxide, lead chromate, strontium chromate, and zinc chromate. IARC has listed chromium metal and its trivalent compounds within Group 3 (The agent is not classifiable as to its carcinogenicity to humans). Chromium is not regulated as a carcinogen by OSHA (29 CFR 1910 Subpart Z). ACGIH has classified chromium metal and trivalent chromium compounds as A4, not classifiable as a human carcinogen. Water soluble hexavalent chromium compounds have been classified by ACGIH as A1, confirmed human carcinogen.

Manganese: Chronic manganese poisoning may result from prolonged inhalation of manganese dust and fumes. The central nervous system is the chief site of damage from the disease, which may result in permanent disability. Symptoms include languor, sleepiness, weakness, emotional disturbances, spastic gait, recurring leg cramps, and paralysis. A high incidence of pneumonia and other upper respiratory infections has been found in workers exposed to dust or fume of manganese compounds. Manganese compounds are experimental equivocal tumorigenic agents. LD50 (oral, rat) - 9 gm/kg; LC50 - NIF; TCLo - 2300 $\mu g/m^3$ (man).

Nickel: Nickel fumes are respiratory irritants and may cause pneumonitis. Exposure to nickel and its compounds may result in the development of a dermatitis known as "nickel itch" in sensitized individuals. The first symptom is usually itching, which occurs up to

7 days before skin eruption occurs. The primary skin eruption is erythematous, or follicular, which may be followed by skin ulceration. Nickel sensitivity, once acquired, appears to persist indefinitely. LC50 - NIF; LD50 (oral) - NIF.

Carcinogenicity - Nickel and certain nickel compounds have been listed by NTP as being reasonably anticipated to be carcinogens. IARC has listed nickel compounds within group 1 (there is sufficient evidence for carcinogenicity in humans) and nickel within group 2B (agents which are possibly carcinogenic to humans). Nickel is not regulated as a carcinogen by OSHA (29 CFR 1910 Subpart Z). Based upon epidemiological data, ACGIH (1998) has designated elemental nickel as category A5, not a suspected human carcinogen. Silicon: Elemental silicon is an inert material which appears to lack the property of causing fibrosis in lung tissue. However, slight pulmonary lesions have been reported in laboratory animals from intratracheal injections of silicon dust. Silicon dust has little adverse affect on lungs and does not appear to produce significant organic disease or toxic effects when exposures are below permissible limits. Silicon may cause chronic respiratory effects. Crystalline silica (silicon dioxide) is a potent respiratory hazard. However, the likelihood of crystalline silica generation during normal processing is very remote. LD50 (oral) - 3160 mg/kg rat; LC50 - NIF.

Molybdenum: Based on animal experiments, molybdenum and its compounds are highly toxic. Some evidence of liver dysfunction with hyperbilirubinemia have been reported in workmen chronically exposed in a Soviet Mo-Cu plant. In addition signs of gout have been found in factory workers and among inhabitants of Mo-rich areas of Armenia. The main features were joint pains in the knees, hands, feet, articular deformities, erythema, and edema of the joint areas. LD50 (oral) - NIF; LC50 - NIF.

Copper: Industrial exposure to copper fumes, dusts, or mists may result in metal fume fever with atrophic changes in nasal mucous membranes. Chronic copper poisoning results in Wilson's Disease, characterized by a hepatic cirrhosis, brain damage, demyelination, renal disease, and copper deposition in the cornea. Copper fume (respirable) has appeared on the ACGIH Notice of Intended Changes (1996 & 1997). The intended ACGIH TLV for respirable copper fume is 0.05 mg/m^3. LD50 (oral) - NIF; LC50 - NIF.

12 - ECOLOGICAL INFORMATION

N/A for solid steel product in its as shipped form. Articles produced from solid product are not an ecological hazard. NIF on specific product to establish its effect if released into the environment in finely divided form. It is believed that finely divided product, based on its components, will be hazardous to fish, animals, plants and the environment if released, the degree of which would depend on the particle size and quantity released. In addition, if particles are small enough, material may be ingested by wildlife, with possible toxic effects. The solid product is not expected to migrate easily into soil or groundwater based upon its insoluble form, however, finely divided material can become mobile in water and contaminate soil and groundwater. This material may persist in the environment for long periods, based upon its corrosion resistant, insoluble, and non-biodegradable properties. In addition, heavy metals may contaminate the food chain and ultimately be consumed by humans. Some components will react with oxygen to form metallic oxides; the rate of oxidation depends upon prevailing conditions. Iron oxidizes most rapidly in moist air. Metallic particulate discharged to a POTW may pass-through or contaminate sewage sludge, may interfere with the treatment system process, and may be non-compliant with a POTW permit or other regulations.

13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: If product as shipped becomes a solid waste, it would not be classified as a hazardous waste, and should be recycled. Product dusts from processing may be classified as a hazardous waste, depending on various properties of the dust (e.g. toxicity, solubility, flammability), which are defined further within 40 CFR 261 and possibly more restricting state and/or local regulations. Solid waste generated from product processing should be classified by a competent environmental professional and disposed, processed, or recycled in accordance with federal, state and local regulations.

14 - TRANSPORT INFORMATION

HAZARDOUS MATERIALS DESCRIPTION/PROPER SHIPPING NAME: N/A for solid formed product.
HAZARD CLASS: N/A for solid formed product.
IDENTIFICATION NO.: N/A for solid formed product.

15 - REGULATORY INFORMATION

SARA TITLE III HAZARD CATEGORIZATION: Product (dust and fume) is categorized as an immediate (acute) health hazard and a delayed (chronic) health hazard as defined by 40 CFR 370.
SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (EHSs): No components are listed as extremely hazardous substances.
SARA TITLE III SECTION 313 REPORTABLE SUBSTANCES: Chromium, Manganese, and Nickel are subject to reporting requirements (Copper is less than the 1% de minimis level).
CERCLA HAZARDOUS SUBSTANCES: Nickel* (threshold 100 lbs.), Chromium* (threshold 5000 lbs.), and Copper* (threshold 5000 lbs.). *Note: CERCLA reporting only if diameter of particles released is less than 100 micrometers.
PENNSYLVANIA R-T-K LIST: Listed components (greater than 0.1 % by weight) - Manganese (E), Molybdenum, Nickel (E,S), Silicon, Chromium (E,S), and Copper (E). E - environmental hazard, S - special hazardous substance.
NEW JERSEY R-T-K ENVIRONMENTAL HAZARDOUS SUBSTANCE LIST: Listed components - Chromium, Copper, Manganese, and Nickel.
CALIFORNIA PROPOSITION 65: Listed possible trace (much less than 0.1% by weight) elements known by the state to cause cancer - Arsenic (inorganic), Cadmium, Lead, Cobalt (metal powder); Listed possible trace elements known by the state to cause reproductive toxicity - Lead; Listed components known by the state to cause cancer - Nickel; Listed components known by the state to cause reproductive effects - None.

16 - OTHER INFORMATION

NFPA RATING (for solid formed product): Health: 1 Flammability: 0 Reactivity: 0
HMIS RATING (for solid formed product): Health: 1 Flammability: 0 Reactivity: 0 PPE: B

ABBREVIATIONS/ACRONYMS:

ACGIH	- American Conference of Governmental Industrial Hygienists	NIF	- No Information Found
CAS	- Chemical Abstracts Service	NIOSH	- National Institute for Occupational Safety and Health
CFR	- Code of Federal Regulations	NTP	- National Toxicology Program
CPR	- Cardiopulmonary Resuscitation	OSHA	- Occupational Safety and Health Administration
EST	- Eastern Standard Time	PEL	- Permissible Exposure Limit
HMIS	- Hazardous Materials Identification System	PNOR	- Particulate Not Otherwise Regulated
IARC	- International Agency for Research on Cancer	PNOC	- Particulate Not Otherwise Classified
mg/m3	- milligram per cubic meter of air	POTW	- Publicly Owned Treatment Works
mppcf	- million particles per cubic foot	PPE	- Personal Protective Equipment
MSDS	- Material Safety Data Sheet	ppm	- parts per million
MSHA	- Mine Safety and Health Administration	SCBA	- Self-contained Breathing Apparatus
N/A	- Not Applicable	STEL	- Short-term Exposure Limit
NFPA	- National Fire Protection Association	TLV	- Threshold Limit Value
NIA	- No Information Available	TWA	- Time-weighted Average

NOTE: The percent composition in Section 2 reflects the range that is possible within this GROUP of products. These are not the technical specifications for a particular product. Also, specific grades may not include all of the hazardous ingredients in Section 2.

DISCLAIMER: All information, recommendations, and suggestions appearing herein concerning the product are based upon data believed to be reliable. It is the user's responsibility to determine the safety, toxicity, and suitability for their own use of the product described herein. Since the actual use by others is beyond our control, no guarantee, expressed or implied is made by AM Health and Safety, Inc. (AMH&S-acting consultant) and Allegheny Ludlum as to the effects of such use, the results to be obtained, or the safety and toxicity of the product, nor does AMH&S or Allegheny Ludlum assume any liability arising out of use by others of the product referred to herein. AMH&S and Allegheny Ludlum shall not in any event be liable for special, incidental or consequential damages in connection with this MSDS. This MSDS is not intended as a license to operate under, or recommendation to infringe on, any patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

This information is not intended to serve as a complete regulatory compliance document. This information is offered as a guide to the MSDS user. No guarantees can be made whether the user will be in complete or correct compliance with all applicable regulations when this MSDS is used. It is the user's responsibility to comply with all federal, state, and local regulations.

PREPARED BY: AM Health and Safety, Inc. (acting consultant)	**REVISION NO.**: 10	**APPROVAL DATE**: September 15, 2002
MFR. CONTACT: J.R. Dierdorf (724-226-6384)	**SUPERSEDES MSDS DATED**: September 15, 1999	

MATERIAL SAFETY DATA SHEET

IDENTITY: **LOW CARBON STEEL PRODUCTS - ALL GRADES**

SECTION I

Manufacturer's Name:
KEYSTONE STEEL & WIRE CO.
Address:
7000 SW ADAMS ST.
PEORIA, IL 61641

Emergency Telephone No:
309-697-7020
Telephone No. for Information
309-697-7020

Date Prepared: May 13, 1999
Date Revised: February 26, 2004

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components:	C.A.S. Number	%
Iron	7439-89-6	>99
Manganese	7439-96-5	<1
Zinc	7440-66-6	*
Lime		*

Percentages are representative of product and may vary depending on batch composition. Due to the variance in batch composition, trace quantities of antimony, arsenic, barium, beryillium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and thallium may be present in amounts <1%.

*A thin coating of oil, lime (<0.5% of total weight of product), or zinc (<2.4 % total weight of product) may be added to the surface as a corrosion inhibitor or preventative.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point:	N/A	Specific Gravity:	Approx. 8
Vapor Pressure (mm Hg):	N/A	Melting Point:	2800°F
Vapor Density (Air = 1):	N/A	Evap.Rate (Butyl Acetate = 1):	N/A
Solubility in Water:	Negligible		
Appearance and Odor:	odorless solid with metallic lustre		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used):	N/A	Flammable Limits:	N/A
Extinguishing Media	Dry Compound or Dry Powder		
Special Fire Fighting Procedures:	NIOSH approved positive pressure, self contained breathing apparatus.		
Unusual Fire and Explosion Hazards:	Spraying water on molten metal may cause an explosion. Use a dry type extinguisher. Product is non-combustible.		

SECTION V - REACTIVITY DATA

Stability:	Unstable ____ Stable XX	Conditions to Avoid:	N/A
Incompatibility (Materials to Avoid):	Strong acids or bases		
Hazardous Decomposition or By-Products:	Metal fumes and certain noxious gases such as CO may be produced during welding or burning operations.		

SECTION VI - HEALTH HAZARD DATA

ROUTE(S) OF ENTRY:	Inhalation?	Skin?	Ingestion?
	XX	XX	

Health Hazards:
(Acute and Chronic): No toxic effects are expected from its inert form. Prolonged, repeated exposure to fumes or dusts generated during heating, cutting, welding, or brazing may cause the following health effects:

Inhalation:

Iron (Fe):	Siderosis, no fibrosis
Manganese (Mn):	Pneumonitis. CNS involvement, including irritability, difficulty in walking, speech disorders, compulsive behavior, masklike face, and Parkinson like syndrome.
Zinc (Zn):	Zinc oxide fumes can cause metal fume fever with symptoms similar to flu: chills, fever, headache, cough, nausea, diarrhea, vomiting, etc.
Soluble Oil:	Pulmonary effects
Lime (CaO):	May cause irritation.
Skin Contact:	May cause irritation. Soluble oil may cause dermatitis.
Eye Contact:	May cause irritation.
Ingestion:	May cause irritation to mouth and throat.

CARCINOGENICITY:	NTP?	IARC Monographs?	OSHA Regulated?
	NO	NO	NO

Sign and Symptoms of Exposure:

Zinc (Zn):	Metal Fume Fever
Manganese (Mn):	irritability, difficulty in walking, speech disorders, compulsive behavior, masklike face, and Parkinson like syndrome.
Medical Conditions Generally Aggravated by Exposure:	None found

Emergency First Aid Procedures:

Inhalation -	If inhaled in large amounts, remove exposed person to fresh air. Get medical attention.
Ingestion -	Call a physician. If swallowed, if conscious, induce vomiting immediately.

Exposure Limits:

Ingredient:	OSHA PEL (mg/M3)	ACGIH TLV (mg/M3)
Iron (Fe)	10 (as Fe_2O_3 fume)	5 (as Fe_2O_3 fume)
Manganese (Mn)	5	1.0 (as fume)
Zinc (Zn)	5-Fume or Respirable dust 10-Total dust	5-Fume 10-Dust
Lime (CaO)	5	5

SECTION VII - PRECAUTIONS FOR SAFE HANDLING USE

Steps To Be Taken in Case Material Is Released or Spilled:	Sweep up spill and place in a container.
Waste Disposal Method:	Dispose in accordance with all applicable federal, state, and local environmental regulations. Can often be sold for scrap metal.
Precautions To Be Taken In Handling and Storage:	N/A
Other Precautions:	Avoid breathing fume or dust. Store away from strong acids and bases.

SECTION VIII - CONTROL MEASURES

Respiratory Protection (Specific Type):	NIOSH approved dust and fume cartridge respirator or supplied air if airborne dust or fume levels are or may be above the PEL. Consult respirator manufacturer for assistance in choosing appropriate respirator. If respirators are used, employees must have a respirator program which complies with OSHA 1910.134
Ventilation:	Local Exhaust - Use to maintain airborne levels below PEL.
Protective Gloves:	Standard
Eye Protection:	As necessary to protect against particles or radiation from welding type operations.
Other Protective Clothing or Equipment:	As needed to protect against heat.
Work/Hygienic Practices:	Use good personal hygiene to avoid ingestion or inhalation through food or smoking.

SARA 313 INFORMATION:

This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CONCENTRATION
Combination of Zinc (CAS No. 7440-66-6) and Zinc Oxide (CAS No. 1314-13-2)	<2.4%
Manganese (CAS No. 7439-96-5)	<1%

Percentages are representative of product and may vary depending on batch composition.

NFPA RATINGS:
Health – 1
Flammability – 0
Reactivity – 0
Special Hazards - NA

The information herein is provided in good faith and is believed to be correct and complete as of the date issued. This document is intended as a guide to appropriate handling precautions for the material. The user is responsible for determining the precautions and dangers of this material for his or her particular application.

No representations or warranties either expressed or implied of merchantability, fitness for a particular purpose or any other nature are made with respect to either the information set forth herein or to the product to which the information refers.

Keystone Steel and Wire shall not be liable for any loss or damage directly or indirectly arising form the use of this product. Keystone Steel and Wire assumes no obligation or liability for reliance on the information contained in this data sheet.

1. Chemical Product and Contact Information

Revised:07/13/02

Product Name: Cast Iron

Part Numbers:
501-937
501-938

LECO Corporation
3000 Lakeview
St. Joseph, Michigan 49085
Information: 269-983-5531
Chemtrec: 800-424-9300
(Chemtrec Int'l: 703-527-3887)

2. Composition/Information on Ingredients

Component	CAS No.	OSHA PEL (mg/m³)	ACGIH TLV (mg/m³)	Typical % by Weight
Iron	7439-89-6	Not given	10	> 96
Carbon	7440-44-0	Not given	10	> 3
Sulfur	7704-34-9	Not given	10	< 1

3. Hazard Identification

EMERGENCY OVERVIEW

No unusual spill or fire hazard; minor health irritant. Light to dark gray fine powder with no odor.

Potential Health Effects

EYES: Irritation.
SKIN: May cause mild irritation.
INHALATION: No immediate symptoms.
INGESTION: Low oral toxicity.
MEDICAL CONDITIONS AGGRAVATED: Not available.
CHRONIC OVEREXPOSURE: Prolonged overexposure to iron dusts may cause a chronic health condition of siderosis which is a benign pneumoconiosis with few or no symptoms.
ACUTE OVEREXPOSURE: Not available.
CARCINOGENICITY: None.

4. First Aid Measures

EYES: Flush thoroughly with water for at least 15 minutes to avoid abrasive damage to outer surface of eye. Seek medical attention if irritation persists.
SKIN: Wash with soap and water. Seek medical attention if irritation persists.
INHALATION: Not available.
INGESTION: Not available.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Non-flammable.
Flash Point: None. Method Used: Not applicable.
Flammable Limits (% by Volume in Air):
Lower: None. Upper: None.
AUTO-IGNITION TEMPERATURE: Not applicable.
HAZARDOUS COMBUSTION PRODUCTS: Not available.
EXTINGUISHING MEDIA: Dry chemical, sand, graphite. Use water only in mist/fog application to avoid spreading powder/dust in surrounding areas.
FIREFIGHTING INSTRUCTIONS: Iron is not considered flammable under most conditions. Avoid airborne dispersion of any finely divided powder in an enclosed industrial area to reduce potential for dust ignition.

6. Accidental Release Measures

SMALL/LARGE SPILL: Recommend use of a vacuum with a HEPA filter; use dust suppressant when sweeping.

7. Handling and Storage

HANDLING: Use good housekeeping practices to prevent accumulation of dust.
STORAGE: Keep container closed. Do not store near strong oxidizers.

8. Exposure Controls/Personal Protection

ENGINEERING CONTROLS: Adequate ventilation to maintain airborne PELs below recommended exposure limits.
RESPIRATORY PROTECTION: Use NIOSH-approved respirators in accordance with 29 CFR 1910.134 where levels exceed exposure limits.
SKIN AND HAND PROTECTION: Use of a barrier cream and/or gloves by employees with skin sensitivity to this material is recommended.
EYE AND FACE PROTECTION: Wear safety glasses or goggles when handling this material. Do not wear any contact lenses in any environment where dust or fumes are present.
OTHER PROTECTIVE EQUIPMENT: Readily available eye baths are recommended in areas where operations may produce dusts.

9. Physical and Chemical Properties

APPEARANCE: Light to dark gray colored fine powder.
BOILING POINT: Not available.
FREEZE-MELT POINT: 2795° F. (1535° C.)
VAPOR PRESSURE (mm): Not applicable.
VAPOR DENSITY (air = 1): Not applicable.
SOLUBILITY IN WATER: Not available.
SPECIFIC GRAVITY: 7.5
pH: Not applicable.
ODOR: None.
PERCENT VOLATILES: Not available.
EVAPORATION RATE (Butyl Acetate = 1): Not available.

10. Stability and Reactivity

CHEMICAL STABILITY: Stable.
INCOMPATIBILITY: Pure oxygen or other strong oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: None.
HAZARDOUS POLYMERIZATION: None.

11. Toxicological Information

None reported.

12. Ecological Information

Not available.

13. Disposal Consideration

Dispose of in accordance with federal, state & local regulations.

14. Transportation Information

U.S.A. DOT: Not regulated.

P/N: 501-937

15. Regulatory Information

U.S. FEDERAL REGULATIONS:

TSCA STATUS: On Toxic Substance Control Inventory.

CERCLA REPORTABLE QUANTITY: None.

SARA TITLE III:

Section 302 Extremely Hazardous Substances:	None.
Section 311/312 Hazardous Categories:	Chronic.
Section 313 Toxic Chemicals:	None.

RCRA STATUS: Not regulated.

CANADIAN REGULATIONS:

WHMIS: Not regulated.

16. Other Information

Prepared By:

Jason Whitt

Information herein is given in good faith as authoritative and valid; however, no warranty, expressed or implied can be made.

P/N: 501-937

1. Chemical Product and Contact Information

Revised:07/13/02

Product Name: Cast Iron

Part Numbers:
501-937
501-938

LECO Corporation
3000 Lakeview
St. Joseph, Michigan 49085
Information: 269-983-5531
Chemtrec: 800-424-9300
(Chemtrec Int'l: 703-527-3887)

2. Composition/Information on Ingredients

Component	CAS No.	OSHA PEL (mg/m³)	ACGIH TLV (mg/m³)	Typical % by Weight
Iron	7439-89-6	Not given	10	> 96
Carbon	7440-44-0	Not given	10	> 3
Sulfur	7704-34-9	Not given	10	< 1

3. Hazard Identification

EMERGENCY OVERVIEW

No unusual spill or fire hazard; minor health irritant. Light to dark gray fine powder with no odor.

Potential Health Effects

EYES: Irritation.
SKIN: May cause mild irritation.
INHALATION: No immediate symptoms.
INGESTION: Low oral toxicity.
MEDICAL CONDITIONS AGGRAVATED: Not available.
CHRONIC OVEREXPOSURE: Prolonged overexposure to iron dusts may cause a chronic health condition of siderosis which is a benign pneumoconiosis with few or no symptoms.
ACUTE OVEREXPOSURE: Not available.
CARCINOGENICITY: None.

4. First Aid Measures

EYES: Flush thoroughly with water for at least 15 minutes to avoid abrasive damage to outer surface of eye. Seek medical attention if irritation persists.
SKIN: Wash with soap and water. Seek medical attention if irritation persists.
INHALATION: Not available.
INGESTION: Not available.

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Non-flammable.
Flash Point: None. Method Used: Not applicable.
Flammable Limits (% by Volume in Air):
Lower: None. Upper: None.
AUTO-IGNITION TEMPERATURE: Not applicable.
HAZARDOUS COMBUSTION PRODUCTS: Not available.
EXTINGUISHING MEDIA: Dry chemical, sand, graphite. Use water only in mist/fog application to avoid spreading powder/dust in surrounding areas.
FIREFIGHTING INSTRUCTIONS: Iron is not considered flammable under most conditions. Avoid airborne dispersion of any finely divided powder in an enclosed industrial area to reduce potential for dust ignition.

6. Accidental Release Measures

SMALL/LARGE SPILL: Recommend use of a vacuum with a HEPA filter; use dust suppressant when sweeping.

7. Handling and Storage

HANDLING: Use good housekeeping practices to prevent accumulation of dust.
STORAGE: Keep container closed. Do not store near strong oxidizers.

8. Exposure Controls/Personal Protection

ENGINEERING CONTROLS: Adequate ventilation to maintain airborne PELs below recommended exposure limits.
RESPIRATORY PROTECTION: Use NIOSH-approved respirators in accordance with 29 CFR 1910.134 where levels exceed exposure limits.
SKIN AND HAND PROTECTION: Use of a barrier cream and/or gloves by employees with skin sensitivity to this material is recommended.
EYE AND FACE PROTECTION: Wear safety glasses or goggles when handling this material. Do not wear any contact lenses in any environment where dust or fumes are present.
OTHER PROTECTIVE EQUIPMENT: Readily available eye baths are recommended in areas where operations may produce dusts.

9. Physical and Chemical Properties

APPEARANCE: Light to dark gray colored fine powder.
BOILING POINT: Not available.
FREEZE-MELT POINT: 2795° F. (1535° C.)
VAPOR PRESSURE (mm): Not applicable.
VAPOR DENSITY (air = 1): Not applicable.
SOLUBILITY IN WATER: Not available.
SPECIFIC GRAVITY: 7.5
pH: Not applicable.
ODOR: None.
PERCENT VOLATILES: Not available.
EVAPORATION RATE (Butyl Acetate = 1): Not available.

10. Stability and Reactivity

CHEMICAL STABILITY: Stable.
INCOMPATIBILITY: Pure oxygen or other strong oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: None.
HAZARDOUS POLYMERIZATION: None.

11. Toxicological Information

None reported.

12. Ecological Information

Not available.

13. Disposal Consideration

Dispose of in accordance with federal, state & local regulations.

14. Transportation Information

U.S.A. DOT: Not regulated.

P/N: 501-937

15. Regulatory Information

U.S. FEDERAL REGULATIONS:

TSCA STATUS: On Toxic Substance Control Inventory.

CERCLA REPORTABLE QUANTITY: None.

SARA TITLE III:

Section 302 Extremely Hazardous Substances:	None.
Section 311/312 Hazardous Categories:	Chronic.
Section 313 Toxic Chemicals:	None.

RCRA STATUS: Not regulated.

CANADIAN REGULATIONS:

WHMIS: Not regulated.

16. Other Information

Prepared By:

Jason Whitt

Information herein is given in good faith as authoritative and valid; however, no warranty, expressed or implied can be made.

P/N: 501-937

MATERIAL SAFETY DATA SHEET (MSDS)
C/R-000-002 REV. 0 DATE 02-10-86
CONFORMS TO REQUIREMENTS OF OSHA STANDARD 1910.1200
"HAZARD COMMUNICATION" AND TO VARIOUS STATE
"EMPLOYEE RIGHT TO KNOW" LAWS

VENDER NAME AND ADDRESS: Cast-Rite Metal Company
P.O. Box 367
Birdsboro, PA 19508-0367

VENDER PHONE NUMBER: (610)582-1300

SECTION I - PRODUCT IDENTIFICATION

THIS MSDS SUPPLIED FOR: ALUMINUM CASTINGS- SERIES 700(TENZALOY, 40E)

SECTION II - HAZARDOUS COMPONENTS

INGREDIENT	CAS NO.	PERCENT	TLV	PEL
Aluminum	7429-90-5	Balance	10 mg/cu.m	N/E
Chromium	7440-47-3	0.06-0.60	0.5 mg/cu.m	1 mg/cu.m
Chromium(Hexavalent)			0.05 mg/cu.m	N/E
Copper	7440-50-8	0.10-1.0	0.2 mg/cu.m (as fume)	0.1mg/cu.m (as fume)
			1 mg/cu.m (as dust)	1 mg/cu.m (as dust)
Iron	7439-89-6	0.10-1.4	5 mg/cu.m (as fume)	10 mg/cu.m (as fume)
Manganese	7439-96-5	0.05-0.60	C 5 mg/cu.m (as dust)	C 5 mg/cu.m (as dust)
			1 mg/cu.m (as fume)	1 mg/cu.m (as fume)
Magnesium	7439-95-4	0.3-2.4	10 mg/cu.m	15 mg/cu.m
Nickel	7440-02-0	<0.15	1 mg/cu.m	1 mg/cu.m
Silicon	7440-21-3	0.2-0.3	10 mg/cu.m	15 mg/cu.m
Titanium(Oxide)	7440-32-6	0.11-0.25	10 mg/cu.m	15 mg/cu.m
Zinc(Oxide)	7440-66-6	2.70-8.0	5 mg/cu.m (as fume)	5 mg/cu.m (as fume)

APPLICABLE ABREVIATIONS/CODES:
N/A means NOT APPLICABLE; N/D means NO DATA AVAILABLE; N/E means NONE ESTABLISHED;
< means CASTING MAY CONTAIN LESS THAN THE GIVEN PERCENTAGE.
"C" means CEILING LIMIT - THESE ARE LIMITS WHICH SHOULD NOT BE EXCEEDED, EVEN FOR A SHORT TIME.

NOTE: Elements having a listed percentage greater than zero will be present in all grades. Those having a value of "0" may not be present in certain grades.
Nickel has been shown to cause cancer in laboratory animals, however, its potential to cause cancer in humans has not been determined.

Water insoluble hexavalent chromium is classified as a human carcinogen by the American Conference of Governmental Industrial Hygienists. Approximately 66% of the total chromium (in welding fume) is hexavalent, and only 5% of that is insoluble. Considering the small amount of chromium in the casting, overexposure to hexavalent chromium is not likely. (There is no hexavalent chromium in the alloy or its dust.)

SECTION III - OVERVIEW

There are no chemical hazards from these castings in solid form. Machining, grinding, flame cutting or welding on the casting will put contaminants, primarily aluminum, silicon and copper in the air. Other toxic metals in the alloy are present in the small amounts that will not represent a hazard if copper and aluminum dust and fume are adequately controlled.

Dust or powder from aluminum castings can be a fire or explosion hazard. Explosive dust concentrations are usually very thick dust clouds, not often found in working areas but which could occur in process vessels, dust collectors or bulk loading operations. The solid casting is not flamable.

The dust or chips from this casting can react violently with halogens (such as chlorine or bromine), halogenated hydrocarbons and oxidants. The aluminum in the casting may react with acids or caustics, producing explosive hydrogen gas.

Fumes and dusts from the casting may irritate the nose and throat. If too much is inhaled, it will cause a sweet or metallic taste in the mouth.

High production machining, grinding, welding operations, etc, should be done under local exhaust ventilation. If ventilation is not adequate, wear a NIOSH approved dust and fume respirator.

Grinding on castings that have not been cleaned may generate significant amounts of dust containing free silica, which can cause silicosis.

SECTION IV - PHYSICAL DATA

PHYSICAL DESCRIPTION:	Silver colored solid bars with no odor.
BOILING POINT:	4220 F (For aluminum)
VAPOR PRESSURE:	N/A
VAPOR DENSITY:	N/A
SOLUBILITY IN WATER:	Not soluble
SPECIFIC GRAVITY:	2.708 (For aluminum)
PERCENT VOLATILE BY VOLUME:	None
EVAPORATION RATE:	N/A

SECTION V - FIRE AND EXPLOSION DATA

Castings in solid form will not burn or explode.

Explosive limits for aluminum dust are lower: 45,000 mg/cu.m

EXTINGUISHING MEDIA: In case of a metal powder/dust fire, use a class "D" fire extinguishing agent (Lith-X, Dry Graphite, etc.) and isolate the fire. Do not use water.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Like all combustible solids, dust from this product can form explosive mixtures in air. Explosive dust concentrations are usually very thick dust clouds, not often found in working areas but can occur in process vessels, dust collectors or bulk loading operations.

SECTION VI - HEALTH HAZARD DATA

EYES: Metal particles in the eyes may cause irritation if not removed.

SKIN: May cause skin irritation.

BREATHING: Breathing excessive amounts of the dust or fumes may cause nose and throat irritation. High levels can result in a sweet or metallic taste in the mouth. Breathing excessive amounts of silica dust for a long time can cause silicosis. Silicosis causes shortness of breath, reduced capacity to do work, and weakens the defenses against other lung diseases.

SWALLOWING: N/A

NOISE: Grinding castings is noisy. The OSHA limit for noise averaged over 8 hours is 90 decibels (dBA), hearing conservation program required if exposure is over 85 dBA. If noise is at or above 90 dBA you should wear ear muffs or ear plugs.

FIRST AID ---

EYES: Metal particles should be removed by trained individuals such as a nurse or a physician.

SKIN: Use a mild hand cream if irritation develops.

BREATHED: Fumes from welding - move to fresh air.

SWALLOWED: N/A

SECTION VII - REACTIVITY DATA

HAZARDOUS POLYMERIZATION: Will not occur.

STABILITY: Stable

INCOMPATIBILITY: Fine castings dust and halogens or finely divided bromates, chlorates or iodates form an explosive mixture. The casting may react with caustics or acids to produce hydrogen gas, which is explosive. Also incompatible with oxidizers.

SECTION VIII - SPILL OR LEAK PROCEDURES

If damaged, return castings to vendor or send to scrap reclaimer.

Collected dust from machining, welding, etc. may be classed as a "hazardous waste" depending on circumstances. Consult local authorities regarding disposal.

SECTION IX - PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: Wear a NIOSH approved respirator for dust or fume if concentrations exceed the TLV or PEL.
VENTILATION: Provide general ventilation and/or local exhaust if necessary to maintain concentrations below the TLVs or PELs.
PROTECTIVE GLOVES: Work gloves advisable for handling castings.
EYE PROTECTION: Safety glasses with side shields and/or face shields for particles (grinding). Welding goggles or helmut for welding.
OTHER PROTECTIVE EQUIPMENT: Wear a protective apron and gauntlets if arc-air gouging or cutting, or welding on castings. If noise is at or above 90 dBA you should wear ear muffs or ear plugs.

SECTION X - SPECIAL PRECAUTIONS / COMMENTS

STORAGE: No special precautions.

NOTE: INFORMATION PRESENTED HEREIN HAS BEEN COMPILED FROM SOURCES CONSIDERED TO BE RELIABLE AND IS ACCURATE AND RELIABLE TO THE BEST OF OUR KNOWLEDGE AND BELIEF BUT IS NOT GUARANTEED TO BE SO.

THE CHEMICAL ALUMINUM(DUST OR FUME), CAS NUMBER 7429-90-5, IS PRESENT IN ALUMINUM CASTINGS - 300 & 700 SERIES - AND IS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 IN 40 CFR, PART 372. THIS NOTICE MUST BE ATTACHED TO THE APPROPRIATE MATERIAL SAFETY DATA SHEET FOR ALUMINUM CASTINGS - 300 & 700 SERIES - AND MAY NOT BE REMOVED FOR ANY REASON.